Twenty-First

ANNUAL CATALOGUE

(1895.)

OF THE

Stoneware Pipe Co.,

EAST ALTON, ILL.,

Manufacturers of SALT-GLAZED and VITRIFIED

SEWER PIPE,

CULVERT PIPE and

DRAIN TILE.

JOHN W. KOCH, Pres. and Treas.
M. H. BOALS, Vice-Pres.
W. W. STICKNEY,
Sec'y and Gen. M'gr.

SENTINEL DEMOCRAT, ALTON

1895. PRICE LIST OF STONEWARE SOCKET SEWER PIPE. 1895.

Inside Diameter of Pipe.	Price of Straight Pipe.	Slants.	Curves and Elbows.	Junctions Reducers and Increasers	Double Junctions and Breeches.	Traps, with Hand-Holes.	Traps, without Hand-Holes.	Area in square inches.	Weight per foot.	Average Car Load in
Inches.	Per Foot.	Each.	Each.	Each.	Each.	Each.	Each.	Sq. In.	Pounds.	Feet.
2 feet. 3	$ 08	$ 25	$ 25	$ 30	$ 45	$ 90	$ 70	7	8	4000
4	10	30	30	40	6	1 00	80	12	10	3000
5	12	40	40	50	7.	1 25	1 00	19	13	2500
6	15	50	50	60	90	1 50	1 25	28	16	2000
8	21	70	75	80	1 30	2 00	1 75	50	25	1200
9	25	80	90	1 00	1 50	2 50	2 25	64	30	1000
2½ ft. Long. 10	30	90	1 10	1 20	1 80	3 00	2 75	78	35	800
12	40	1 20	1 40	1 50	2 40	4 00	3 75	113	45	600
14	50	1 50	1 70	1 80	3 00	5 00	4 75	154	55	500
15	55	1 65	1 90	2 00	3 30	00	5 75	177	60	400
16	60	1 80	2 10	2 40	3 60	00	6 75	201	65	350
18	75	2 25	2 50	3 00	4 50	8 00	7 75	254	75	300
20	90	2 70	3 00	3 50	5 40	10 [illegible]	9 50	314	90	260
22	1 10	3 30	3 50	4 20	6 60	12 00	11 50	380	110	230
24	1 50	4 00	5 00	6 00	9 00	15 00	14 50	452	140	200
30	3 00	8 00	8 00	10 00	18 00	20 00	19 50	707	200	130

☞DISCOUNT TO THE TRADE, 50 to 60 PER CENT. ACCORDING TO SIZE.☜

☞SPECIAL FITTINGS MADE TO ORDER ON REASONABLE NOTICE.☜

SALT GLAZED STONEWARE PIPES

Have long been regarded as the most reliable material in use for sewerage purposes by the most eminent civil engineers in all the leading cities of Europe and the United States, and most of the large cities of this country are using this kind of pipe exclusively for the smaller sewers in preference to brick or stone. The pipes being smooth and uniform inside, offer less obstruction to the current than brick surfaces, and being vitrified and glazed, are indestructible by sewer acids or the weather.

It is hardly necessary to say a word as to the DURABILITY of the material, for almost everyone is familiar with common stoneware jugs and crocks, and our pipes are made of similar material, and burnt to a vitreous body, and glazed with a coating of true glass, and such pipes are no more subject to decay than glass itself.

These pipes are made with sockets, by means of which the joints can be made water-tight if necessary by the use of a little hydraulic cement mortar to fill the crevices about the end of the pipe within the socket, thus forming a solid, immovable joint as soon as the cement sets. One part of cement to two parts common sand are the proportions generally used for cement mortar.

The size of pipe required in each particular case depends, of course, upon the amount of water to be provided for, and this depends upon the area of ground from which the rainfall runs to the sewer. This area can generally be estimated with sufficient accuracy by careful observation, without surveying instruments.

Statistics show that in this section of the country the amount of rainfall during the heaviest storms rarely amounts to one inch in depth of solid water, over any surface, in one hour.

One acre of water one inch deep measures 22,633 gallons, which is the amount of water which MAY FALL on one acre in one hour, and one sixtieth part of this, or 377 gallons, is the quantity which may fall on the same acre in one minute; but owing to various obstructions not more than three-fourths of this water would reach the sewer the same hour. Therefore, any sewer of sufficient size and fall to pass three fourths of 377 gallons in a minute, or say 300 gallons in a minute, is large enough to drain one acre in the heaviest rains.

Therefore, to find the size of pipe required for any number of acres multiply the number of acres by 300, and then find in the following table the number equal to or next larger than this product in the column indicating the fall of the proposed sewer, and the figures at the extreme left in the same horizontal line will indicate the proper size of pipe. If one pipe is not sufficient, lay two or more pipes abreast, as is often done, to obtain the required capacity.

Table Showing the Carrying Capacity of Pipe for Different Grades, in Gallons per Minute.

SIZE OF PIPE.	*1 inch fall per 100 ft.*	*2 inch fall per 100 ft.*	*3 inch fall per 100 ft.*	*6 inch fall per 100 ft.*	*9 inch fall per 100 ft.*	*1 foot fall per 100 ft.*	*2 feet fall per 100 ft.*	*3 feet fall per 100 ft.*
2 inch.	6	8	10	16	18	20	28	35
3 "	13	19	23	35	40	46	64	79
4 "	27	38	47	66	81	93	131	163
5 "	46	64	85	124	142	186	258	348
6 "	75	105	129	183	224	258	364	450
7 "	110	158	198	268	340	402	548	681
8 "	153	216	265	375	460	529	750	923
9 "	205	290	355	503	617	711	1006	1240
10 "	267	378	463	655	803	926	1310	1613
12 "	422	596	730	1033	1273	1468	2060	2554
14 "	580	846	1061	1464	1782	2074	2842	3676
15 "	740	1021	1282	1818	2224	2464	3617	4467
16 "	864	1240	1840	2142	2611	2980	4321	5232
18 "	1168	1651	2022	2860	3508	4045	5704	7047
20 "	1519	2152	2629	3717	4562	5259	7449	9124
22 "	1924	2718	3335	4657	5788	6684	9447	11577
24 "	2396	3387	4152	5871	7202	8303	11744	14466
30 "	3833	5418	6643	8806	11523	13284	17616	23145

DIRECTIONS FOR LAYING PIPE.

The construction of a pipe sewer is a very simple matter, but should nevertheless be done with care.

The main thing is to BED the pipes properly, so as to give them a firm and uniform bearing at every point in their lower surface.

After bringing the bottom of the trench to grade, cut out little depressions for the sockets, so that the body of the pipes, when laid, will rest firmly on the grou d.

If the ground is SOLID it is well to round out the bottom of the trench, so as to fit the pipes as accurately as may be; but this is often impracticable from the nature of the ground, and the same effect may be produced by carefully packing and ramming the loose earth as solidly as practicable under the lower surface up to the center line of the pipes.

In laying the pipes commence at the outlet, or lower end, of the sewer, and place the pipes in position with sockets facing up grade, and if the bottom of the trench has not been rounded out to fit the pipe, PACK AND RAM the filling FIRMLY under and up to the center line of the pipe, as above described.

This is of the GREATEST IMPORTANCE, and greatly increases the strength of the sewer by making available the full strength of the pipes.

The practice of putting boards or planks in the bottom of the trench to lay the pipes on is worse than useless, because only the sockets can rest on the plank; or, if pipes without sockets are used, they can touch the plank only on the extreme bottom line of their surface, and almost the entire pressure of the superincumbent earth is thus transmitted to a very narrow segment of the bottom wall of the pipes, which, resting on this solid, unyielding bearing, cannot of course sustain one-half the load the pipes could stand with safety if properly bedded, as already described.

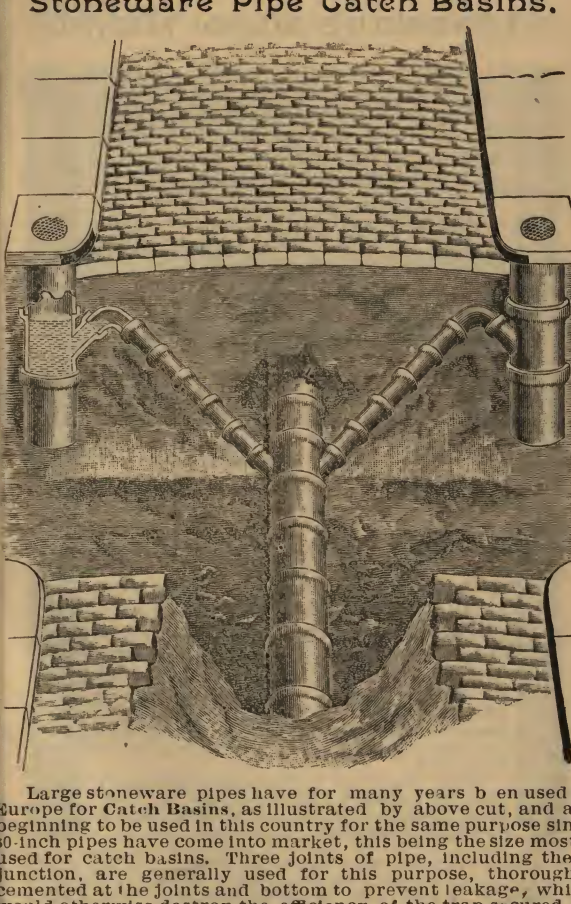
In common drains or waste pipes it is not necessary to use any mortar or soft clay about the joints, but in aqueducts or cistern inlets, when the joints are required to be water-tight, use mortar to fill in about the joints, or soft clay well worked into the sockets around the ends of the pipes will do.

When mortar is used care should be taken to remove from the inside of the pipes all fragments of mortar which may work through between the joints, as otherwise the rough, projecting points of mortar, when hardened, might catch any waste matter passing through the pipes and gradually obstruct the discharge.

In answer to numerous inquiries as to how deep in the earth our stoneware pipes may be safely laid, it may be said, in general, the deeper the better.

There is not, to our knowledge, a single instance on record where a sound stoneware pipe, properly bedded in a deep cut, has ever been crushed by the superincumbent earth. The fact is that in deep cuts the filling over the pipes is partially supported by the sides of the cut, and forms a kind of arched bridge over the pipes, so much so that if the pipes could be carefully removed without disturbing the earth above, when once well settled, the superincumbent mass would still retain its position for awhile.

Stoneware Pipe Catch Basins.



Large stoneware pipes have for many years b en used in Europe for **Catch Basins**, as illustrated by above cut, and are beginning to be used in this country for the same purpose since 30-inch pipes have come into market, this being the size mostly used for catch basins. Three joints of pipe, including the Y junction, are generally used for this purpose, thoroughly cemented at the joints and bottom to prevent leakage, which would otherwise destroy the efficiency of the trap secured by maintaining the water level above the Y junction.

It will be observed that this method of constructing catch basins is admirably adapted to prevent the street rubbish from getting into the sewers, because all street washings *heavier* than the water would necessarily sink to the bottom, and all such washings *lighter* than the water would necessarily remain on top of the water, above the Y junction. Therefore nothing but the water with its matters held in solution can, under such conditions, get through the inlet to the sewer, leaving all solid matter in the catch-basins, to be removed whenever convenient

STONEWARE WELL TUBING.

Within the past few years stoneware pipe have come into very general use for tubing bored wells, and they are certainly the cleanest and most durable materials ever used for that purpose. Where there is no stone to obstruct the boring, wells can be easily and cheaply made with augers similar to post augers, constructed for the purpose, and such wells when lined with this stoneware tubing are superior to all kinds of wells in use for cleanliness and durability.

For this use the sections are usually made without sockets, so as to fit the holes more closely, but some prefer the regular socket joint, as this makes a more solid job, each joint fitting accurately into the end of the next, thus forming a continuous tube. Pipes without sockets are twenty per cent. cheaper, and about fifteen per cent. less in weight.

Our 30-inch pipes are also used extensively for well curbing, especially in sandy ground, where common wells are not easily made, and when made are constantly filling up with quicksand, but with these pipes a well can be put down with ease, even in a bank of quicksand. This is best done by a man getting inside the pipe, and as he throws out the sand the pipes settle down by their own weight. When the first pipe gets below the surface put on another, and so continue to do until the required depth is reached.

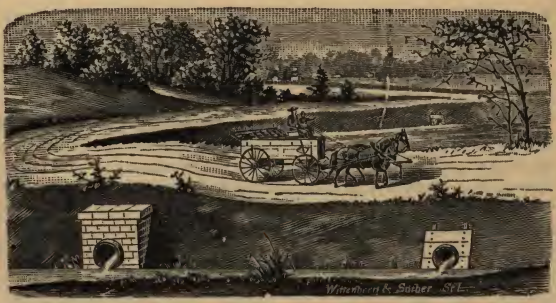
This work can be done very effectually with well augers, which are now so constructed as to bore wells of all sizes from 10 to 40 inches diameter.

PRICE LIST OF STONEWARE SOCKET WELL TUBING.

Inside size, inches	10	12	14	15	16	18	20	22	24	30
Price per foot.....	.15	.20	.25	.30	.35	.40	.50	.60	.80	$1.50

☞20 per cent off for Well Tubing without Sockets.

STONEWARE PIPE CULVERTS.



Cheap, Substantial, Everlasting.

We desire to call the attention of County Road Commissioners, Supervisors and Overseers of common roads throughout the country to the rapidly increasing use of our heavy vitrified Stoneware Culvert pipes in place of all small plank bridges and box culverts, still so common in country roads, and which are constantly getting out of repair, and last but a few years at most; whereas a Stoneware Pipe Culvert, when once well put in, will last for ages without any repair, and in the long run will prove cheapest as well as best. For this purpose we make all larger sizes much heavier and stronger than ordinary sewer pipe. See specification as to weight and thickness in the table on page 10.

This is what is known as DOUBLE-STRENGTH CULVERT PIPE, which have long been used for the smaller class of railroad culverts, where strength and durability are usually considered of more consequence than a little extra outlay in first cost, but it is only within a year or two that improved methods of manufacture have so far reduced the cost of production of these heavy pipes as to enable the manufacturer to offer them at such prices as would justify their general adoption in common country roads.

If the top of the pipe, when laid, is less than two feet below the surface of the road-bed, first cover the pipe with dirt to the depth of a few inches and level it off; then place a few poles, fence rails or planks over the pipes lengthwise, and throw on more dirt and grade up to the level of the road-bed. The rails or poles will serve to equalize the pressure on the pipes when the wheels of

heavy wagons pass over them; but if the dirt is two feet deep or more no other protection is necessary.

This system of improvements gives universal satisfaction, for there is nothing that intelligent people appreciate more than good roads, well improved in such a way that they will stay improved, and there is nothing which more plainly indicates the progressive spirit of a community than the quality of its public improvements, the most important of which are undoubtedly the public highways throughout the country at large, and the time is not far distant when the people at large will insist upon the thorough and durable improvements of these highways for their own convenience before they will be willing to be called upon to pay taxes for costly county buildings, designed as much for mere show as for utility.

The reduced prices we are now giving certainly bring it within the means of every road district in every county to put in at least a few of these Stoneware Pipe Culverts every year without materially increasing the highway taxes, and if all would only do this in a few years every highway in every county would be thus **permanently** improved, for, be it remembered, when this work is once done it is done for generations.

Let every Road Overseer or Supervisor into whose hands this circular may fall, put in at least one of these pipe culverts as an experiment, if none have yet been tried in his district, and we guarantee that it will give more satisfaction for the money invested than any other work done on the road, and will introduce a system of substantial improvements which has never failed to become popular wherever once introduced.

The ends of the culvert should be protected by small abutments of stone or plank, as represented in the cut, otherwise the end pipes would be liable to be undermined by the action of the water

The foundation of the abutment should of course extend far enough down into the ground to be below the influence of frost, as otherwise the alternate heaving and settling might throw the end pipe out of position. When stone or brick abutments are too expensive, a good and cheap substitute can be made of plank, by setting them on end deep enough in the ground to hold them in place, and fitting them nicely about the pipe; or, still better, by setting a post each side of the pipe and spiking the planks on horizontally, as represented in the cut on the previous page. When planks or posts are used it is best to set them with considerable inclination towards the road-bed, to prevent the pressure of the embankment from crowding the planks outward.

. . . . PRICE LIST AND SPECIFFICATIONS OF . . . .

SALT-GLAZED and VITRIFIED Double-Strength STONEWARE CULVERT PIPE.

INSIDE DIAMETER.	PRICE PER LINEAL FOOT.	SECTIONAL AREA.	THICKNESS OF SHELL.	LENGTH OF JOINT.	WEIGHT OF JOINT.	AVERAGE CAR LOAD.
8 inch.	$ .21	50 sq. in.	1 inch.	2 feet.	50 lbs.	1,200 feet.
9 "	.25	64 "	1 "	2 "	60 "	1,000 "
10 "	.30	78 "	1 "	2½ "	85 "	900 "
12 "	.40	113 "	1⅛ "	2½ "	120 "	600 "
14 "	.50	154 "	1¼ "	2½ "	150 "	500 "
15 "	.55	177 "	1¼ "	2½ "	170 "	400 "
16 "	.60	201 "	1⅜ "	2½ "	190 "	350 "
18 "	.75	254 "	1½ "	2½ "	240 "	300 "
20 "	.90	314 "	1⅝ "	2½ "	290 "	250 "
22 "	1.10	380 "	1⅞ "	2½ "	350 "	200 "
24 "	1.50	452 "	2 "	2½ "	420 "	150 "
30 "	3.00	707 "	2½ "	2½ "	750 "	110 "

DISCOUNT TO THE TRADE, 40 TO 50 PER CENT., ACCORDING TO SIZE.

☞ When sizes and quantities wanted are specified, prices will be quoted on same, delivered at any station accessible by river or rail, if so desired, all freight and breakage to be charged back to us.

Fire Clay Socket Chimney Pipe.


Plain Pipe.


Pipe Hole.


2 Pipe Holes.


Chime Bottom.


Drop Bottom.

We manufacture Fire Clay Pipe from six to twelve inches in diameter expressly for chimneys. The 8-inch pipe is the size generally used for this purpose, and is quite large enough for two ordinary house fires. If more than two are to be connected with the chimney we would recommend the 9-inch pipe. The 12-inch pipe is used for furnaces, etc.

Within the last few years pipe chimneys have come into very general use, especially where bricks are not plenty and cheap, and they give entire satisfaction.

In fact, pipes make a more perfect chimney than bricks, a smooth, round bore being the best possible form for a smoke flue.

They are easily and quickly put up and secured in place by strong wires, and by any intelligent person, dispensing entirely with the services of a brick mason.

The pipes are generally set with the socket end up, which gives the best opportunity to make the joints tight with mortar or soft clay.

But there is one material advantage in setting the socket end DOWN, because in this way the mortar or cement used in filling in about the joints is entirely protected from the rain and snow, and will consequently remain in good condition much longer; and, besides, sparks can not fly out at the joints with sockets down, as they might possibly do with sockets up, in case the filling about the small end of the pipe should become loosened or displaced. We are, therefore, inclined to prefer the socket end down, and we make our round Chimney Tops, illustrated on next page, to fit either way.

Where no fire-places are used it is not necessary, of course, to have the pipes extend to the floor, but the chimney may be started at any point in the first or second story, by making a firm bearing for the bottom pipe at the desired point, on a strong shelf or bracket, securely fastened to the wall.

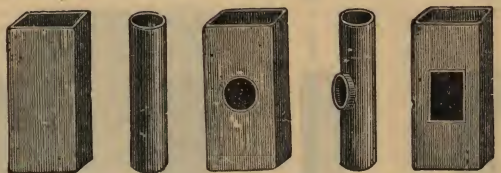
Where the chimney comes through the roof, a piece of tin or sheet iron should be fitted closely around the pipe, and plastered up tight with good mortar or cement to prevent leakage.

NET PRICE LIST.

Stove Pipe Holes and other fittings 15 cents extra.

Size of Flue.	*Price per foot.*	*Weight per foot.*	*Area in inches.*
6 inch.	9 cts.	15 lbs.	28 sq. in.
8 "	12 "	20 "	50 "
9 "	15 "	25 "	64 "
10 "	20 "	30 "	78 "
12 "	30 "	40 "	113 "

FIRE CLAY FLUE LININGS.



Plain. *Plain.* *Pipe Hole.* *Pipe Hole.* *Register.*

Very few first-class houses, either public or private, are now built without fire-clay flue-linings, either round or rectangular, for each smoke flue in the chimneys, thus effectually protecting the buildings against fires, which so frequently originate from defective flues.

Round flue linings are undoubtedly best, as well as a little cheapest, according to their capacity—a smooth, round bore being the best possible form for a smoke flue; but most *bricklayers* prefer to use the rectangular forms, on account of the exact correspondence of their sides with the length of a brick, or a brick and one-half, so that no extra cutting and fitting of bricks is required to make good joints and solid work around them.

The stove pipe hole in the round flue lining, when in position, is intended to be flush with the surface of the wall, and projects about four inches from the flue for this purpose.

These flue-linings are also very generally used for hot-air flues, instead of tin, for conducting the heat from furnaces to the several rooms in the house, being much superior to tin for this purpose, as they are not liable to rust out or communicate fire to the contiguous wood work through which they pass.

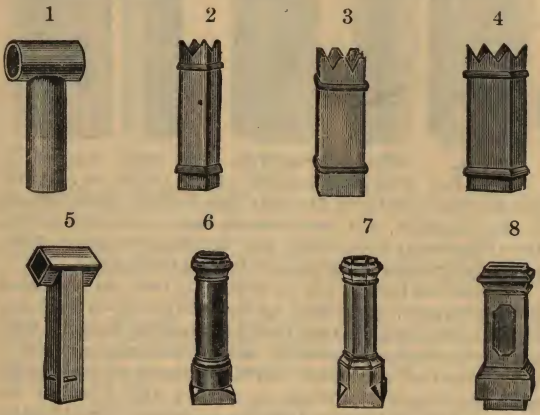
All the prominent insurance companies recognize the additional safety against fire secured by the use of these flue-linings by insuring buildings thus protected at cheaper rates than they otherwise would.

NET PRICE LIST.

DEMENSIONS.	Price per ft.	Weight per ft.
8-inch inside, Round.....	10 cents.	20 lbs.
9 " " "	12 "	25 "
10 " " "	15 "	30 "
12 " " "	20 "	40 "
8½x8½ inches outside, Square	10 "	20 "
8½x13 " " "	15 "	30 "
13x13 " " "	20 "	40 "

Register and Pipe Holes, 10 cents extra.

Fire Clay Chimney Tops.



These Chimney Tops are easily applied to any common chimney by taking out a few bricks sufficient to give the Top a firm hold in the brickwork, and then replacing the bricks about the base of the chimney top with cement or mortar.

These tops give a pretty finish to the chimney, and Nos. I and 5 prevent rain and snow from falling in at the top.

——::——

PRICE LIST.

No. 1	Round	Flue,	6-inch	inside,	3 ft	high	$1.00
" 1	"	"	8 "	"	3 "	"	1.25
" 2	Square	Flue,	8½x8½	-inch	outside,	3 ft. high	1.00
" 3	"	"	8½x13	"	"	3 " "	1.25
" 4	"	"	13x13	"	"	3 " "	1.50
" 5	"	"	8½x8½	"	"	3 " "	1.25
" 6	Round	"	11	"	"	3½ ft. high	2,00
" 7	Octagon	Flue,	11	"	"	3½ " "	2.25
" 8	Square	"	9x13	"	"	3½ " "	2.50

Fire Brick Manufactured from the Celebrated Missouri Fire Clay.

We make a uniform price for all shapes of fire Brick represented in the above diagrams.

NET PRICE LIST FOR FIRE BRICK AND CLAY F. O. B. HERE.

No. 1 Fire Brick, all shapes per 1000	$20 00
Milled Fire Clay for Mortar per bbl	1 25
Milled Fire Clay for Mortar per ton	3 00
Weathered Fire Clay for Foundry use per ton	2 00

We also manufacture a superior article of square and hexagon sidewalk brick, 9"x9"x2", and half brick to make a straight finish or border on the sides and ends of the walk.

Our sidewalk brick are all pressed and vitrified, and are more durable than stone.

Vitrified Sidewalk Brick per 1000	$20 00
Half Brick for sides and ends per 1000	15 00

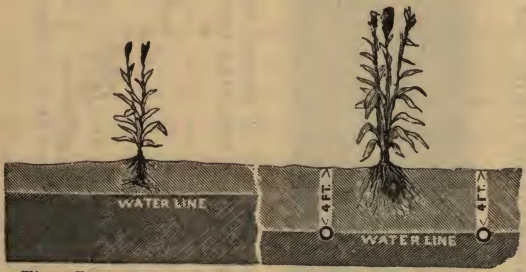
STONEWARE DRAIN TILE.

Farm Drainage is now firmly established in the country as the land owner's safest and most profitable investment.

It has long been so regarded in the older countries, but it is only within the last few years that Tile Drainage has attained its present vast proportions in this country, though a few long-headed and long-pursed farmers commenced tiling on a comparatively small scale, fifteen or twenty years ago, when the tile cost double the present price. And to the enterprise and experience of these pioneers in the drainage business, is largely due the present wonderful activity in this line of improvement.

They all DESERVE a PENSION, but it is doubtful if a single one of them can be found who NEEDS one, for the tiling they put in so long ago, and at so great expense, has undoubtedly provided them a pension for life, by more than doubling the net annual income of their farms. And such pensions have a great advantage over those granted by the government, because they do not stop with the life of the original beneficiary, but continue right on in full measure, for the benefit of his heirs and assigns to the end of time.

THE EFFECTS OF DRAINAGE.



The effect of drainage upon the soil and growth of plants is very well illustrated by the above cut. The roots of the plant in the undrained soil are confined near the surface. Cut off by the water line, the plant yellows and dwarfs. The roots of the plant in the drained soil run down, and spread out in search of supplies, hence the vigorous growth. This shows how under-draining makes profitable fields otherwise entirely unproductive, increases the income of others, and conduces to the general health of the country by preventing the accumulation of stagnant water.

It is claimed that the experience of our most practical and successful farmers shows that the increase of crops by under-draining will pay all expenses within three years on the average, and often in less time, besides the sanitary effects on the health of the neighborhood by removing stagnant pools and their malarial poison.

STONEWARE DRAIN TILE.

The beneficial results of the Tile Draining are now so well understood and appreciated by the majority of our intelligent farmers that any discussion of that subject seems superfluous.

But there is still considerable difference of opinion as to what constitutes the BEST QUALITY of tile, and the best methods of laying them in order to secure the best and most lasting results, and a few words on these points will certainly not be out of place here.

First, as to the SHAPE of the tile: it seems to be pretty well settled that the ROUND tile is the best; and, in fact, very little tile of any other shape is now produced, except on old dies made long ago.

The only advantage ever claimed for the octagonal, the horseshoe or the flat-bottomed tile, is that tiles of these shapes are more likely to keep their exact position when laid in the trench than the round tile, but experience has not shown any material difference in this respect in favor of or against any shape of tile when once properly laid in position. But, on the other hand, experience HAS shown that SEDIMENT is more likely to settle and accumulate in flat-bottomed tiles than in round tiles. Moreover, the round tiles have another decided advantage over the flat-bottomed tiles, in being so much more capable of accurate adjustment, by laying ANY SIDE UP, which may be required to neutralize any slight curvature or other irregularity in the tile.

For these and other minor reasons the round tile has naturally superseded all other shapes.

——::——

MATERIAL AND TEXTURE.

It was once generally believed, and is still believed by many people, that Drain Tiles should be POROUS, in order to ABSORB the water through the walls of the tile, but it is now known that the water enters the tile at the JOINTS, and nowhere else to any appreciable extent; and instead of being an ADVANTAGE to have the tiles POROUS, it is a positive and serious DEFECT, for porous tiles do indeed ABSORB water and HOLD it like a soft-burned brick or a sponge, and if they happen to FREEZE while in this condition—as some of them are liable to do in the severity of winter—the tiles are bound to scale or crumble more or less, and finally give way altogether.

MATERIAL AND TEXTURE.—*Continued.*

Hence, the hard-burned, vitreous and consequently NON-POROUS tiles are the best in every respect. And the best material to make them of is the regular stoneware Potters' clay, mixed with FIRE CLAY enough to hold the tiles in shape when fired up to the heat of thorough vitrification.

The common red brick clay, now so much used for tile in some parts of the country, cannot be fired up to the vitrifying point without warping the tiles too much out of shape.

This matter of QUALITY is of the utmost importance, and no man can AFFORD to take any chances of ultimate failure by using a poor quality of tile, when the best is within his reach, at about the same cost: for the labor and expense of putting in either is the same, but there is as much difference in the DURABILITY of the different qualities of tile as there is between Oak or Hickory and Cottonwood, and, in fact, MORE; for the hard-burned, vitrified and glazed Stoneware Tile is absolutely IMPERISHABLE from any natural agencies. When a man once gets his land tiled with this quality of tile, he will have no occasion to feel any anxiety every Spring after a hard Winter, to see whether or not his drains are working all right.

We are manufacturing genuine STONEWARE Drain Tiles from exactly the same materials that we use for first-class sewer pipes, and we burn them the same length of time, say from three to four days and nights, until they acquire that dense and vitreous texture which render them indestructible by frost or any other natural causes.

—·—

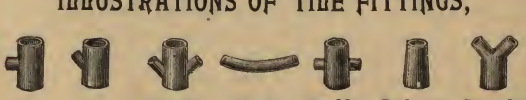
We can't, of course, sell such tile at the same price as common red tile, on account of the extra expense of mining the clay and burning the ware. But the twenty per cent. discount now offered (see price list next page) brings the net cost down pretty near the red tile figures, and, considering the quality of our goods, we are confident that our tile is **practically cheapest,** *as the best quality of any material is generallñ cheapest in the long run, and this old maxim is especially applicably to tile improvements, both as to the quality of the tile and the work of putting it in.*

PRICE LIST OF STONEWARE DRAIN TILE.

Size Inside.	Price per 1000 feet.	Junctions Curves and Reducers, each.	Double Junctions and Breeches, each.	Sectional area.	Weight per foot.	Average Car Load: 30,000 Pounds
Inch.	Dollars.	Cents.	Cents.	Sq. in.	Lbs.	Feet.
3	15	8	16	7	5	6,000
4	20	10	20	12	7	4,000
5	30	15	30	20	10	3,000
6	40	20	40	28	13	2,400
7	50	25	50	38	16	2,000
8	70	30	60	50	20	1,500
9	90	35	70	64	24	1.200
10	110	40	80	78	30	1,000
12	150	50	100	113	36	750
14	180	60	120	154	45	600
15	200	70	140	177	55	500
16	240	80	160	201	60	450
18	300	90	180	254	70	350
20	350	100	200	314	80	300
22	400	110	220	380	100	250
24	500	120	240	452	130	200
30	1000	200	400	707	180	150

Discount 20 per cent. on car load lots.

ILLUSTRATIONS OF TILE FITTINGS,



T. Junction. *Y. Junction.* *Double. Y.* *Curve.* *Double. T.* *Reducer.* *Breeches*

☞ **In ordering Fittings, please designate them by the names printed under the cuts respectively.**

All sizes, from 2 to 8 inch, inclusive, made in one foot lengths, and all larger sizes made in 2 to 3 feet lengths, unless otherwise ordered.

When sizes and quantities wanted are specified, price will be quoted on same, delivered at destination, if so desired.

JUNCTIONS AND LATERALS.

The method of connecting branches with the main drain is of very great importance, but we have reason to believe that in many parts of the country very little attention is given to those natural laws in accordance with which all such connections should be made.

The above cut represents the several methods of making such connections, all of which are still in use to some extent.

The method represented at *A* is the most primitive of all, and consists simply in leaving a break in the main line large enough to receive the end ef the branch tile, all to be covered over with broken pieces of tile or otherwise after the branch tile is inserted.

The method represented at *B*, though more elaborate, is not much better, and consists of cutting a hole through one side of the tile large enough to admit the branch tile.

The objection to both of these methods is that connections made in this way are necessarily *rough* on the inside, and the branch tile is generally left projecting more or less into the main, thus diminishing its capacity, and if the brancn tile is put in at *right angles* to the main, as is often the case, the water from the branch materially checks the force of the current in the main, which, practically, still further diminishes its capacity.

C represents a regular right angular junction, moulded before the tile was burned and while in the plastic condition, and perfectly smooth both inside and outside, and the only objection to this method is that it admits the water at *right angles* to the current of the main, which should *never be done under any circumstances*, for the force of the branch current rushing in square *across* the main current, checks the flow very materially in the main, while, at the same time, the discharge of the *branch* is also materially reduced by the current of the main flowing square *across* the current of the branch.

But the *slant* or Y junction represented at D obviates this objection, and is really the *only proper form* to use for connecting branches with the main, for it admits the water at an angle of 45 degrees, and instead of checking the flow in the main it helps it along, and more than *double* the amonnt of water can be passed through any

given main, when the laterals are thus properly connected, than could pass if the same number of laterals were connected in any of the other ways mentioned, hence this method has naturally superseded all others among well informed tile drainers.

E represents a *reducer*, used in changing from a larger to a smaller size in the same line of tiling. Such connections are generally made without using any reducer, simply by placing the ends of the large and small tile together, and covering the imperfect joints thus made by broken pieces of tile, or otherwise, to keep the dirt out, but the reducer makes a much neater and more perfect joint, and leaves all smooth on the inside as well as outside.

If all the branches run at *right angles* to the main, as represented at *A*, page 21, two or three curved tiles should be used in connection with the Y junction in making the turn around from the main to the line of the branch. If such a turn is made with straight tiles, the *inside* must necessarily be left very rough and angular at the joints, and these imperfections retard the flow of water to a much greater extent than is generally supposed—not less, probably, than *twenty-five per cent.* of the capacity of the tile.

If the branches come into the main at an angle of about 45 degrees, no curves are necessary, as this is the angle of the Y junction. But where the branches come in as represented at *C* and *D*, page 21, more curves should be used than for the right angular turns first described.

It is perfectly practicable to take branches into the main at any angle which the shape of the land may require, by the judicious use of plenty of curves, and all the slightly curved tiles, if any, found among the straight ones, should be carefully reserved for such use, if none have been ordered for this purpose, and should be liberally used in making branch connections as above described, and also in making any material change in the direction of the main line itself, which is often necessary.

Next to *irregular grades*, *imperfect joints* are the most fruitful causes of drains failing to work satisfactorily, and a small amount of extra care and expense in perfecting these inlets and curvatures when putting in the tile, may save much labor, expense and annoyance in making future repairs.

All these little things increase the capacity and the durability of the drain, and cannot be neglected with impunity.

Pipe Wells and Silt Basins.

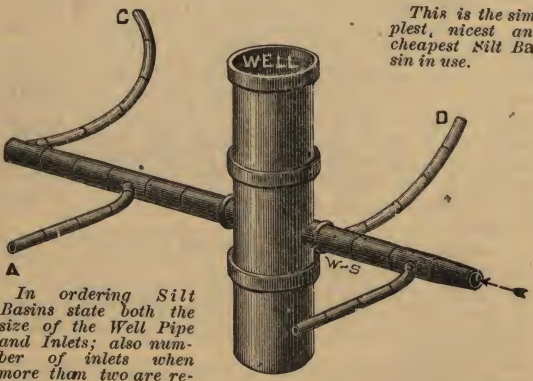
The large upright pipes in the cut below represent a WELL made of socket sewer pipe and placed right in the line of the drain, which passes directly through the Well, as indicated. This serves the double purpose of a Well and Silt Basin to catch the sediment which always finds its way into tile drains to some extent, and will settle in the bottom of the Well, from which it can easily be removed as often as necessary.

The well pipes should extend a few feet below the level of the drain to make plenty of room for the deposit of silt as well as for drawing the water with bucket or pump, and should come up far enough above the surface for convenience, and to keep out surface washings and animals.

A *well of running water* is something rather "new under the sun," but such wells seem likely to become as common as tile drainage itself, for the cost of putting them in is so trifling compared with their convenience, that few enterprising farmers will hesitate to put in at least one well in every tile-drained field, for the benefit of both man and beast.

Fifteen inches inside diameter is a convenient size of pipe for wells—either for pump or bucket—and we furnish ten feet of this size of glazed stoneware socket pipe, including the double T junction for the inlet and outlet, for three dollars, and other sizes in same proportion.

No purer or more healthful drinking water can be obtained than the clear, limpid stream which issues from a good tile drain, and the comfort and satisfaction of having such water within easy reach in every field for the use of working stock and thirsty man, during the hot, sultry days of summer, will more than repay the cost of the wells every season.



This is the simplest, nicest and cheapest Silt Basin in use.

In ordering Silt Basins state both the size of the Well Pipe and Inlets; also number of inlets when more than two are required.

IMPROVEMENT OF PUBLIC HIGHWAYS.

The subject of road improvement has lately come into great prominence as a public enterprise, and frequent conventions of highway commissioners are being held all over the country to exchange views as to the best methods of securing the common object. The drift of public opinion seems to be decidedly in favor of the liberal use of Stoneware Pipe Culverts, as evidenced by the resolutions recently passed by several such conventions.

Another very practical and popular method of improving roads is by *Tile Drainage*, which, according to the unanimous testimony of those who have tried it, is a great success.

The chief cause of bad roads is simply *too much water*, and the most obvious preventive is the rapid removal of that water, so as to give the roads a chance to dry and harden, without waiting for the water to disappear by the slow process of evaporation.

This is readily accomplished by laying a string of tile of sufficient capacity along one or both sides of such roads as are liable to get soft in Spring and Fall, and extending the tile to a good outlet.

A very commendable co-operative plan is being carried out in many counties where the road commissioners buy the tile required to improve the roads, and the adjoining farmers haul the tile and put it in the ground, at their own expense, in consideration of the privilege of using such road drains as outlets for their own smaller tile drains, thus securing the improvement of the roads and the adjacent farms at the same time.

We are manufacturing a very superior grade of drain tile of all sizes from three to thirty inches inside diameter, using the same materials we do for culvert pipe, and we burn the tile in the same kilns and the same length of time, till thoroughly vitrified and glazed. See price list on page 18.

We also manufacture all sizes, from 3 to 30 inch caliber, of vitrified and glazed Sewer Pipe, which, in many places, is preferable to drain tile for road drainage, even at the extra cost, on account of the *sockets*, which hold the pipes firmly in position, where drain tile, without sockets, might wash out during high water on grades sufficient to create strong currents.

The extra cost is not so very much, at the present prices and discounts for Sewer Pipe. See Price list on page 1.

Special Drainage Districts.

The law makes it the duty of the Commissioners of Highways in this State to organize Special Drainage Districts, under the general State Law, when so requested by parties in interest, hence all information relative to the best methods of accomplishing the desired results in such cases should naturally be of great interest to such Commissioners, in view of their liability to be called upon to act in this capacity.

We therefore offer a few suggestions on the subject, as the results of our own experience and observation, hoping they may prove practically useful to all interested in such matters.

The object usually aimed at in these Drainage Districts is two-fold: first, to provide for the rapid removal of the SURFACE WATER, and second to provide OUTLETS for the underdrains.

The usual method of securing this double object is to make open ditches of width and depth supposed to be sufficient for both purposes.

Such open ditches have generally proved satisfactory so far as the surface water is concerned, but not so satisfactory as outlets for tiling, especially where such outlets come into the open ditch near the BOTTOM, where they necessarily have to come in, as a general thing, in order to give the LATERALS SUFFICIENT FALL.

The trouble arises from the constant tendency of open ditches to FILL UP more or less with accumulations of mud, grass and weeds to such an extent as to materially obstruct the discharge from the laterals.

Of course this can be mostly prevented by constant watchfulness and promptness in removing such obstructions, as often as they come; still, if there is any BETTER way, it seems rather poor policy to let the success of such expensive and important improvements as TILE DRAINAGE depend wholly, or in part, upon anything which requires constant care to keep it in good working order, particularly as such care and attention is generally most needed when the farmer has no time to spare for such purposes, and the work is consequently apt to be neglected or put off till much damage is caused by the obstructions damming back the water in the laterals for weeks, and perhaps months together, thus holding up the water level or line of saturation in the land, to the great injury of the growing crops.

A similar stoppage of the laterals is often caused by ICE in Winter, which sometimes closes the outlets alto-

SPECIAL DRAINAGE DISTRICTS.—*Continued.*

gether, thus effectually suspending the action of the underdrains, which ought to be at work, day and night, removing the surplus water from the soil, thereby greatly increasing its capacity of absorbing the rainfall of early Spring.

We believe it to be much more important than is generally imagined for tile underdrains to continue in active operation all Winter, for all the water which the tiles bring out in Winter leaves room for the same quantity of rain water in the early Spring, and consequently the land itself becomes a huge RESERVOIR, which greedily sucks down the Spring rains out of the way of the plow, and can, in fact, be WORKED even before any large proportion of the water has found its way out through the tiles.

Another objection to tiling into open ditches is the obstruction of the discharge from the laterals caused by the surface water itself, when abundant enough to fill the ditch more or less above the level of the tile outlets, as it often does for weeks together, thereby causing the loss of much valuable time by suspending wholly, or in part, the action of the laterals; for the water level, or plane of saturation in the ground itself, can never go down any faster than the surface of the stream in the ditch containing the tile outlets. If, therefore, the ditch gets quite full up to the surface of the tiled land, of course no water at all can get out of the laterals, which can resume their work only as the water in the ditch goes down.

In view of all these facts and liabilities, the belief is fast gaining ground, that while wide, open ditches are the most practicable known means of disposing of the surplus surface water, they by no means constitute the best MAINS for the drains, and that a complete system of underdrainage requires the MAINS to be made of tile as well as the laterals, and happily this is now practicable at a much more moderat expense than formerly, by reason of the reduction in the price of large tiles which can now be obtained of any size up to and including thirty inches diameter.

The most approved method then of accomplishing the two-fold object, or we might as well say the TWO DISTINCT objects aimed at in special drainage districts, is to make broad but not very deep open ditches, sufficient to carry off the surface water within a reasonable time after the rain falls or the snow melts. We say ditches "NOT VERY DEEP," because more cheaply made with plow or scraper, and less liable to fill up, and at the same time sufficient for the required work.

The banks of the ditch may be graded off smooth and level on both sides, convenient for cultivation, and seeded in tame grasses, thus preventing the unsightly jungles of weeds and bushes which often disfigure the bank of open ditches.

After the surface water is thus provided for, then find the lowest and best principal OUTLET in the whole district, and begin there with a large tile, proportioned to

SPECIAL DRAINAGE DISTRICTS.—*Continued.*

the area and grades of the land to be tiled, and run a main drain up through the district, branching off into sub-mains of smaller size if necessary, and putting in junctions for laterals wherever needed, so that the mains need not be disturbed when once completed.

These mains will form the BACK BONE of a complete system of tiling, and when the laterals are all properly laid and connected with the mains, the job is finished, and should require no further attention for generations, except to keep an eye on the main OUTLET of the whole system, in case of any accummulation of sediment or other obstruction at that point.

All the objections to the tiling into open ditches are effectually obviated by such a system, because the laterals, discharging directly into the main tile, can never become obstructed by mud, grass or weeds, or by ice, or by high water in the open ditch.

The underdrains can, therefore, all go right along with their salutary work by day and by night, through Summer and Winter, taking the water out and letting the air in, from the beginning to the end of the year, and this is undoubtedly as near perfection as any system of drainage ever invented.

The co-operative basis on which Special Drainage Districts are organized, makes the cost of such large tile mains comparatively moderate to each individual land owner, the expense being divided among so many, and being so much superior in every respect to open ditches for the purpose required, large tile mains seem likely to become the rule instead of the exception, as heretofore.

Now, a few words as to the locations of such tile mains; shall they be laid in the bottom of the open ditches, or elsewhere?

We should say, locate the mains where they will best accommodate the laterals, regardless of the open ditches which should have no connection whatever with the tiling. If, however, the open ditch happens to be in the best location for the tile main, there is no objection to laying it in the bottom of the open ditch, provided the joints are CEMENTED, to prevent the ditch water from crowding down into the main tile in times of high water, and thus causing the same obstruction to the laterals as though the latter discharged directly into the open ditch.

—:—

We are making a specialty of LARGE TILE of superior quality, the same, in fact, as first-class sewer pipe, the only difference being in the socket, which the sewer pipes have and the drain tiles do not have. See price list page 18.

We also carry in stock a large assortment of junctions, and we again call attention to the subject of Junctions and Laterals, as treated on pages 15 and 16.

TESTIMONIALS.

We are aware of the increasing prejudice against voluminous testimonials relative to the merits of standard goods, as savoring too strongly of patent medicine methods of advertising, and probably not one customer in a hundred ever takes the trouble to read them. Instead of taxing your patience and credulity with a batch of such credentials we submit the following significant and practical propositions, which we trust will be much more satisfactory.

1st. We do not ask our customers to depend upon windy talk or cheap testimonials for information relative to the actual value and quality of our goods, but let the goods speak for themselves, and guarantee every shipment to be satisfactory on arrival at destination, or no pay.

2nd. We want no man's money without giving a fair equivalent for it, believing this to be the only equitable basis of trade, and the foregoing guarantee places the enforcement of these conditions entirely in the hands of our customers.

In conclusion we desire to say:

It is our intention to furnish our goods to customers at the lowest practicable cost. Large sales and small PROFITS being our motto.

We shall be glad to correspond and advise with all parties interested, and will quote prices of our goods delivered in good order, at DESTINATION, if desired, when sizes and quantities wanted are specified.

Yours respectfully,

The Stoneware Pipe Co.

Save This Book for Future Reference.

IN ordering Fittings please designate them by the names printed under the cuts respectively. Page 2.

Don't wait till you are ready to USE the pipe or tile before ordering, but order long enough before the goods are needed, to prevent annoyance by the unexpected delays that are always liable to occur in transportation.

Thanking our old customers for past favors, we respectfully solicit a continuance of their patronage, and invite new customers to "sample" our goods before placing their orders elsewhere.

Samples will be sent on application, without charge, to parties proposing to use our goods if satisfactory.

Freight or expressage on such samples chargeable to us when goods are ordered from same, but not otherwise.

Prices will be quoted for our goods DELIVERED at DESTINATION in Good Order when so desired, if sizes and quantities are specified.

The Stoneware Pipe Co.,

East Alton, Ill.

Save This Book for Fu nce.

IN ordering Fittin esig-
nate them by th inted
under the cuts respec ge 2.

Don't wait till dy to
USE the pipe or tile ering,
but order long en e the
goods are needed, t nnoy-
ance by the unexpect at are
always liable to occur rtation.

Thanking our ers for
past favors, we re olicit a
continuance of their and in-
vite new customers le" our
goods before placing ers else-
where.

Samples will application,
without char ies pro-
posing to use our g isfactory.

Freight or e on such
samples chargeable en goods
are ordered from s ot other-
wise.

Prices will be our goods
DELIVERED NATION
in Good Order desired, if
sizes and quantiti ified.

The Sto ipe Co.,
t Alton, Ill.